UCL Institut de statistique

STAT

STAT2414 Times series

[22.5h+7.5h exercises] 5 credits

This course is taught in the 1st semester

Teacher(s):	Rainer von Sachs
Language:	french
Level:	2nd cycle course

Aims

The aim of this course is to give a good comprehension of the theory and application of stochastic time series modelling, with a view towards prediction (forecasting).

Main themes

The principal subjects of this course on an introduction into time series analysis will include the modelling, estimation and prediction of two types of processes - linear processes and heteroscedastic models of non-linear processes. We follow basically a parametric approach - the student will learn how to quantify statistical uncertainty while estimating the model parameters for the problem of forecasting future values of the observedseries.

Content and teaching methods

Content
1. Modelling time series data: an introduction
2. Linear processes - simple parametric models (ARMA)
3. Estimation and prediction of ARMA models
4. Box-Jenkins analysis - (S)ARIMA models
5. Non-linear processes - heteroscedastic (G)ARCH models - applications to modelling financial data

Methods
Basic models of linear time series will be treated in the first part. The data analysis, i.e. estimation of the model parameters for forecasting, will be based predominantly on Box-Jenkins methods. In the second part of the course some elements of modelling financial data with the more recently developed ARCH and GARCH models will be given and included into the practical part of the course (done with the S-Plus software).

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Prerequisites
A general knowledge of basic statistical concepts (on the level of a first introductory course in statistics) is necessary.
Evaluation
The examination will be oral. An applied data analysis project has to be prepared on the computer.
Teaching material
Course notes, von Sachs, R. and S. Van Bellegem, Script.
References :
Brockwell, P., Davis, R. : Introduction to Time Series and Forecasting. 1996, Springer, New York
Brockwell, P., Davis, R. : Times Series : Theory and Methods. 1991, Springer, New York
Gourieroux, Ch. : Modèles ARCH et applications financières. 1992, Economica, Paris
For more information:
http://www.stat.ucl.ac.be/cours/stat2414/index.html http://www.stat.ucl.ac.be/cours/stat2414/index.html

Other credits in programs

ECGE3DS/MK	Diplôme d'études spécialisées en économie et gestion (Master in business administration) (marketing)	(5 credits)	
MAP23	Troisième année du programme conduisant au grade d'ingénieur civil en mathématiques appliquées	(3.5 credits)	
MATH22/S	Deuxième licence en sciences mathématiques (Statistique)	(3.5 credits)	Mandatory
STAT2MS	Master en statistique, orientation générale, à finalité spécialisée	(5 credits)	
STAT3DA/B	diplôme d'études approfondies en statistique (biostatistique et épidémiologie)	(5 credits)	
STAT3DA/E	diplôme d'études approfondies en statistique (statistique et économétrie)	(5 credits)	
STAT3DA/M	Diplôme d'études approfondies en statistique (méthodologie de la statistique)	(5 credits)	
STAT3DA/P	diplôme d'études approfondies en statistique (pratique de la statistique)	(5 credits)	